

## Claims

1. A metrology instrument for samples containing grating-like microstructures thereon, the instrument comprising:

means for supporting a sample in measurement relation to the instrument, the sample having at least one grating-like microstructure formed thereon, the sample producing a characteristic optical signature when illuminated which is indicative of parameters of interest of the microstructure,

an illumination source directing light along an illumination path,

an elongated pupil aperture located in the illumination path,

an objective focusing the light received from the aperture to the sample, the elongated pupil aperture and objective defining an elongated illumination spot on the sample, the elongated pupil aperture and elongated illumination spot having respective long directions which are perpendicular to each other, the measurement relation of the sample to the instrument being such that the illumination spot is oriented generally transverse to linear elements of the microstructure,

optical means for collecting and detecting the optical signature from the illuminated sample, and

processing means for determining from said detected signature the parameters of interest of the grating-like microstructure on the sample.

2. The instrument of claim 1 wherein the optical signature comprises a reflected intensity spectrum, the optical means including a spectrometer component measuring said spectrum.

3. The instrument of claim 1 wherein the objective is characterized by a low numerical aperture producing focused illumination with a narrow range of incidence angles in the direction generally transverse to the linear elements of the microstructure.

4. The instrument of claim 1 wherein the microstructure to be measured is a checkerboard-type bigrating structure, rows and columns of features defining linear elements of the microstructure, the elongated pupil aperture having a width dimension and the objective having focusing parameters selected such that the illumination spot has a narrow dimension corresponding to a width of a single row or column of the bigrating structure.

5. The instrument of claim 1 wherein the processing means determines a best fit of the detected optical signature to a theoretical signature corresponding to a specific set of values for the parameters of interest.